

**U.S. Department of the Interior  
Bureau of Land Management**

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**Environmental Assessment**

**Murdoch Allotment #17741**

**March 2016**

**PREPARING OFFICE**

U.S. Department of the Interior  
Bureau of Land Management  
Worland Field Office





# **Introduction**

## **Identifying Information:**

### **Title, EA number, and type of project:**

Murdoch Allotment #17741.

EA number DOI-BLM-WY-R010-2015-0033-EA,

New grazing permit

### **General Location of Proposed Action:**

The Murdoch Allotment is located approximately seven miles west of Embar, Wyoming.

T.43N. R.100W. Section 9, 10, 15.

### **Name and Location of Preparing Office:**

Worland Field Office

101 S. 23rd St.

Worland, WY 82401

### **Lease/Serial/Case file number:**

GR4916176

### **Applicant Name:**

Anthony and Betty Jean Martinez

### **Background Information:**

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of issuing a new permit on the Murdoch Allotment #17741. Anthony and Betty Jean Martinez applied for the grazing privileges on the Murdoch Allotment. Anthony and Betty Jean Martinez have been determined to be a qualified applicant (4110.1 (b)).

The Worland Field Office performs Rangeland Health Assessments using Technical Reference 1734-6 “Interpreting Indicators of Rangeland Health” to determine if Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Land Administered by the Bureau of Land Management in the State of Wyoming (S&Gs) approved August 12, 1997 are being met. Field work to determine S&Gs was completed for these allotments in 2014 with the subsequent determinations signed in 2015. Through the S&Gs it has been determined that there are acres in the allotments that are not meeting rangeland health standards and acres that are meeting rangeland health standards. These Rangeland Health Determinations are posted at <http://www.blm.gov/wy/st/en/info/NEPA/documents/wfo/rhealth.html>.

### **Purpose and Need for Action:**

The purpose of this action is to analyze the issuance of new grazing permits for the above mentioned allotment within the Worland Field Office with appropriate terms and conditions to promote rangeland health (based upon potential of site). The purpose of this EA is to determine

the amount of permitted use based on current resource conditions, season of use, type of livestock, and under what terms and conditions would be applied to grazing management for the grazing permits.

The need for this action is BLM's responsibility to issue grazing permits in accordance with the provisions of the Taylor Grazing Act, Federal Land Policy and Management Act, Public Rangelands Improvement Act, Administrative Procedures Act, Worland Resource Management Plan (WRMP 2015) and the grazing regulations 43 CFR 4100.

## Decision to be Made

The Authorized Officer (AO) must determine whether or not to issue a grazing permit to the applicant. If a permit is issued the AO must identify specific terms and conditions that apply to the permit to achieve management and resource condition objectives for the public lands.

## Conformance

This plan has been reviewed to determine if the proposed action conforms to the land use plan as required by 43 CFR 1610.5. The proposed action conforms to the Record of Decision and Approved Resource Management Plan for the Worland Field Office, dated September 21, 2015. The decisions in the WRMP provide general management direction and allocation of uses and resources on the public lands in the area.

Livestock Grazing Management Goals and Objectives	
Goal LR: 10 - Continue ecosystem benefits of herbivory by providing opportunities for livestock grazing to support and sustain local communities consistent with goals and objectives of other resources and overall land health.	
Objectives-	
LR: 10.1 Manage livestock grazing consistent with multiple-use needs, sustained yield, and the Wyoming Standards for Healthy Rangelands (BLM 1997). Adjust management based on assessments and evaluations.	
LR: 10.2 Provide for the establishment of voluntary reserve common allotments as opportunities arise within the planning area to facilitate rangeland restoration, recovery, and management objectives (in accordance with existing policy, WO IM 2013-184).	
LR: 10.3 Manage levels of livestock use in a manner that strives to maintain or restore permitted use based on forage availability consistent with multiple use.	
Record Number	Management Action
Livestock Grazing Management	
6206	<p>The planning area is open to livestock grazing except in areas specifically closed to grazing, such as:</p> <p>Manage livestock grazing to support other resource objectives and allow livestock grazing in areas closed to grazing as a tool to maintain or improve resource conditions.</p> <p>Mitigate new resource uses to minimize or avoid conflicts with livestock grazing where appropriate.</p>

6202	<p>Utilize a rangeland health assessment, resource monitoring, or analysis to determine if livestock grazing adjustments in amounts, kinds, or season are necessary. The NEPA analysis for renewals and modifications of livestock grazing</p> <p>permits/leases that include lands within PHMAs will include specific management thresholds based on Greater Sage-Grouse Habitat Objectives Table (Table 2.7, “Greater Sage-Grouse Seasonal Habitat Objectives” (p. 22)) and Land Health Standards (43 CFR 4180.2) and one or more defined responses that will allow the authorizing officer to make adjustments to livestock grazing that have already been subjected to NEPA analysis. Greater Sage-Grouse Habitat Objectives Table (Table 2.7, “Greater Sage-Grouse Seasonal Habitat Objectives” (p. 22)), Land Health Standards (43 CFR 4180.2) and ecological site potential, and one or more defined responses that will allow the authorizing officer to make adjustments to livestock grazing that have already been subjected to NEPA analysis.</p>
6198	<p>In cooperation, consultation, and coordination with permittees/lessees, cooperators, and interested public, develop and implement appropriate livestock grazing management actions to enhance land health, improve forage for livestock, and meet</p> <p>other multiple use objectives by using the Wyoming Guidelines for Livestock Grazing Management, other appropriate BMPs (see Appendix C, Required Design Features and Best Management Practices (p. 251)), and development of appropriate range improvements. The BLM will prioritize (1) the review of grazing permits/leases, in particular to determine if modification is necessary prior to renewal, and (2) the processing of grazing permits/leases in PHMAs. In setting workload priorities, precedence will be given to existing permits/leases in areas not meeting Land Health Standards, with focus on allotments containing riparian areas or wet meadows. The BLM may use other criteria for prioritization to respond to urgent natural resource concerns (e.g., wildfire) and legal obligations.</p> <p>The BLM will collaborate with appropriate federal agencies, and the State of Wyoming as contemplated under Governor EO 2013–3 (Wyoming Office of the Governor 2013), to 1) develop appropriate conservation objectives; 2) define a framework for evaluating situations where Greater Sage-Grouse conservation objectives are not being achieved on federal land, to determine if a causal relationship exists between improper grazing (by wildlife or wild horses or livestock) and Greater Sage-Grouse conservation objectives; and 3) identify appropriate site-specific actions to achieve Greater Sage-Grouse conservation objectives within the framework.</p>
6214	<p>Allotments within PHMAs, focusing on those containing riparian areas, including wet meadows, will be prioritized for field checks to help ensure compliance with the terms and conditions of the grazing permits (Appendix O, Livestock Grazing (p. 565)). Field checks could include monitoring for actual use, utilization, and use supervision.</p>
Vegetation - Grassland and Shrubland Communities	
4027	<p>Manage native plant communities (Map 3-15) in accordance with <i>Wyoming Standards for Healthy Rangelands</i> (BLM 1997). Use ESDs and other available information, resource objectives established in this RMP, and specific management practices to maintain or achieve the standards.</p>
4029	<p>Manage to achieve or make progress toward the appropriate community phase for the site. In plant communities determined to be meeting Wyoming Standards for Healthy Rangelands, manage to maintain or improve those communities.</p> <p>Potentially manage some areas for a higher plant community state or phase (based on state and transition models in ESDs) where site-specific management objectives determine that a higher plant community state or phase is desirable. In these areas the desired plant community states or phases will be determined on a site-specific basis at the implementation level.</p> <p>Manage areas at a lower level of ecological status to provide preferred habitat for wildlife species with unique habitat requirements on a case-by-case basis.</p>
4030	<p>Manage to maintain contiguous blocks of native plant communities and minimize fragmentation; allow for appropriate mosaic of interrelated plant communities while allowing for other resource uses.</p>

Fish and Wildlife Resources - Wildlife	
4058	Maintain or improve important wildlife habitats through vegetative manipulations, habitat improvement projects, livestock grazing strategies and the application of The Wyoming Guidelines for Managing Sagebrush Communities with Emphasis on Fire Management (Wyoming Interagency Vegetation Committee 2002) and the Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (Appendix F, Wyoming Bureau of Land Management Mitigation Guidelines for Surface-Disturbing and Disruptive Activities (p. 351)), BMPs (Appendix C, Required Design Features and Best Management Practices (p. 251)), and similar guidance updated over time.
Fish and Wildlife Resources – Special Status Species – Sage-grouse	
4099	In cooperation with stakeholders, manage to promote the growth and persistence of native shrubs, grasses, and forbs needed by Greater Sage-Grouse for seasonal food and concealment.
4112	In PHMAs, implement mitigation and minimization guidelines and required design features, including specific measures for Greater Sage-Grouse (refer to Appendix C, Required Design Features and Best Management Practices (p. 251)) as applicable and consistent with EO 2015–4 (Wyoming Office of the Governor 2015). Incorporate Greater Sage-Grouse specific measures into project proposals as required design features or mitigation for any authorized federal action, regardless of surface ownership.

## Relationship to Statutes, Regulations, Plans or Other Environmental Analysis:

This Environmental Assessment is being prepared in accordance with Washington Office (WO) Instruction Memoranda WO-IM-99-039 and 2000-022 as well as WY-IM-2000-20, which instruct all Bureau of Land Management (BLM) Field Offices to conduct National Environmental Policy Act (NEPA) review on grazing permit renewals. The primary regulations governing the analysis are 40 CFR 1500 (RE: The President’s Council on Environmental Quality implementing regulations for procedural provisions of NEPA). The principal Bureau permitting regulations for livestock grazing are found in 43 CFR 4100. The principal statutes governing livestock grazing on public land are the Taylor Grazing Act of 1934, the Federal Land Policy and Management Act of 1976, and the Public Rangelands Improvement Act of 1978.

This action is in accordance with the following Grazing Management Regulations: 43 CFR 4110.3 and 43 CFR 4180

- “The authorized officer shall periodically review the permitted use specified in a grazing permit or lease and shall make changes in permitted use as needed to manage, maintain or improve rangeland productivity, to assist in restoring ecosystems to properly functioning condition, to conform with land use plans or activity plans, or to comply with the provisions of subpart 4180 of this part. These changes must be supported by monitoring, field observations, ecological site inventory or other data acceptable to the authorized officer.”
- “The authorized officer shall take appropriate action under subparts 4110, 4120, 4130, and 4160 of this part...upon determining that existing grazing management needs to be modified...”

This action is also subject to national level BLM and Wyoming BLM policy regarding Greater Sage-Grouse Habitat Management found in the following Instruction Memoranda: WO-IM-2012-043 and WY-IM-2012-019.

- “To ensure that the NEPA analysis for permit/lease renewal has a range of reasonable alternatives:
  - “Include at least on alternative that would implement a deferred or rest-rotation grazing system, if one is not already in place and the size of the allotment warrants it.”

- “Include a reasonable range of alternatives (e.g., no grazing or a significantly reduced grazing alternative, current grazing alternative, increased grazing alternative, etc.) to compare the impacts of livestock grazing on Greater Sage-Grouse habitat and land health from the proposed action.”

## **Scoping, Public Involvement and Issues:**

### **Scoping**

The scoping process for the Murdoch Allotment Grazing Permit EA began with a review of the proposed action by an interdisciplinary team. The applicant for the action was consulted on alternative development and livestock management. The applicants and interested publics were given the opportunity to be involved in the S&G process.

It was determined that further external scoping was necessary and comments were accepted for the Murdoch EA prior to its development. A news release and notice of scoping was issued on March 9, 2015. It was published in the Thermopolis Independent Record on March 19, 2015. The public scoping period ran from March 9-23, 2015. Written comments were received from Wyoming Game and Fish Department, Wyoming Department of Agriculture, Western Watershed Projects, and Wyoming Outdoor Council.

Comments received from the Wyoming Game and Fish Department included:

Cattle versus domestic sheep grazing is consistent with the “Wyoming Statewide Domestic/Bighorn Sheep Interaction Plan” that strives to reduce the risk of disease transmission to wild sheep in the area.

The allotment is within the Grass Creek sage-grouse core area. Grazing is considered a de minimus activity when practices are maintaining or enhancing Wyoming rangelands (Executive Order 2011-5 Attachment C and Executive Order 2013-3).

WGFD has documented winter sage-grouse use in the area, specifically in T.43N. R.100W. Sections 2 and 3.

The allotment is crucial winter range for mule deer in the Owl Creek/Meeteetse mule deer herds.

Although not directly a grazing issue, lessees should be aware that grizzly bears occur in the area and there is potential for conflicts, depending on the livestock use period.

Comments received from the Wyoming Department of Agriculture included:

We support the continuance of grazing on the allotment and encourage the BLM to consider the following during the EA process: changes in Animal Unit Months (AUMs) across alternatives and re-issuance of any suspended AUMs, changes to grazing strategies to enhance or improve livestock grazing and achievement of rangeland health standards and guidelines, infrastructure that may be added to the allotment to improve livestock efficiency, and the associated economic impacts of the alternatives.

Peer reviewed science and allotment data should underlie the BLM’s decisions. The BLM should identify the science and data supporting their decisions and planning regarding this project. Decisions in the proposed plan should allow BLM officials and grazing permittees the opportunity to work cooperatively and adaptively. BLM should provide enough flexibility to ensure the best decisions are made throughout the life of this project.

We also encourage the BLM to work with the permittee and keep them informed during the process so they may bring forward any relevant issues.

Comments received from Western Watershed Project included:

This tiny allotment which if left ungrazed/unpermitted could act as a recovery control which is sorely lacking since the Worland BLM grazes about 99% of the field office. Give it a break and let it rest.

A summary of comments from Wyoming Outdoor Council included an inquiry of the type of grazing permit, name of the applicant, and kind of livestock permitted.

## **Issues Identified**

### **Cultural**

How would renewal of the grazing permit affect cultural resources eligible or unevaluated for the NRHP?

#### *Range Administration*

How would the proposed action and other alternatives impact the range administration in the allotment?

### **Native Vegetation**

How would the proposed action and other alternatives allow for the vegetative community of the allotment to maintain Rangeland Health Standard 3?

### **Soils/Hydrology (Runoff, Water Quality)**

How would the issuance of a grazing permit impact the soil and water resources as related to rangeland health standard 1? *“Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.”*

If a change in runoff were to occur as a result, what would be the impact to water quality from a new grazing permit in the watershed of the allotment?

### **Wildlife**

How would the proposed action and other alternatives affect important habitats used by mule deer, antelope, and sagebrush obligate birds like the sage-grouse, as related to rangeland health standard 4? *“Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened species, endangered species, species of special concern, or sensitive species will be maintained or enhanced.”*



## Proposed Action and Alternatives

The alternatives were developed based upon the proposals from the applicant, and BLM Policy Instruction Memorandums: WY-IM-2000-020, WO-IM-2012-043, and WY-IM-2012-019. The alternatives were developed to address the grazing impacts on public lands within the allotment, to consider the permittee's ranching resource goals and operations, and to provide the opportunity for specific comparisons on which the decision maker could base a decision. The table below outlines the alternatives.

Alternative	Operator	Number of Animals	Kind	Season of Use	% Public Land	Active AUMs	Suspended AUMs	Total Preference AUMs
No Action/ No Grazing	N/A	N/A	N/A	N/A	N/A	0	0	0
Proposed Action	Anthony & Betty Jean Martinez	82	Cattle	7/19 to 8/20	83%	74	0	74

### Description of Alternatives Analyzed in Detail:

#### Description of the No Action Alternative:

The no action alternative would also be the no grazing alternative. Under the no action/no grazing alternative, no livestock grazing would be permitted on the Murdoch Allotment, approximately 420 public land acres. The grazing permit would not be issued to the applicant. The grazing preference for the allotment would be removed from the Worland RMP which would require an amendment of the RMP. This action does not meet the Purpose and Need, but is considered to provide a full range of alternatives in accordance with WO-IM-2000-022.

#### Description of the Proposed Action:

Under the proposed action alternative, a new grazing permit would be issued to Anthony and Betty Jean Martinez for 10 years. Eighty two (82) cattle would be authorized from July 19 through August 20 for 74 public AUMs.

All livestock grazing would be deferred until after the growing season (May to July 15). The permit would incorporate other terms and conditions which would allow livestock numbers to vary during the season as long as Active AUMs are not exceeded; and incorporates a 50% utilization threshold that would require a management change to reduce grazing use if that threshold is exceed in two consecutive years of use (Appendix C).

The amount of active AUMs would be based on suitability/expected use following the guidelines of Holechek et. al. for grazing use based on slope and distance from water sources (2011). Then the suitable acres would be stocked for a targeted use of 35% use of the current year's growth while the Ecological Site Descriptions recommend a stocking rate based upon a 50% use level.

#### Design Features and Best Management Practices

The action, as proposed and described above, would follow the BMP's for livestock grazing within Appendix L of the Final EIS. Pertaining to sage-grouse habitats: there are no new range improvements proposed within this document, nesting and brood rearing habitats would be maintained or improved through the appropriate stocking rates and season of use, there are no riparian areas that would be impacted and heavy use is not prescribed by the proposed decision-conservative use is. As pertaining to the vegetative community, recent monitoring has

been conducted to define the ecological states within the allotments. Thereby, allowing a proper stocking rate and season of use to be proposed to ensure that those sites capable of improving are given the opportunity while those sites with limited capabilities are given the opportunity to maintain their current ecological state.

### **Alternatives Considered but not Analyzed in Detail:**

The comments submitted during scoping were determined to be similar to the alternatives already developed. No new substantive issues were raised that were not already analyzed. The comments from the Wyoming Game and Fish were addressed in the Wildlife section of the EA. The comments from the Department of Agriculture were addressed throughout the EA and in the development of the alternatives. The comment from Western Watershed Project was addressed in the No Action/No Grazing alternative of the EA.

# **AFFECTED ENVIRONMENT and ENVIRONMENTAL EFFECTS**

This chapter characterizes the resources and uses that have the potential to be affected by the proposed action, followed by a comparative analysis of the direct, indirect and cumulative impacts of the alternatives. **Direct** effects are caused by the action and occur at the same time and place. **Indirect** effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. **Cumulative** impacts result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions.

## **Introduction**

### **General Setting and Geographic Scope of the project area**

The Murdoch Allotment (**Map 1**) is located approximately nine miles west of Embar, Wyoming. The elevation of the allotment is approximately 6500 feet above sea level. The allotment encompasses approximately 510 total acres with 420 public land acres and 90 private land acres. Precipitation in the area has average 10.76 inches over the last 37 years (1978 – 2014) according to the O. B. Reservoir Rain Gauge.

### **Resources Carried Forward for Analysis**

#### **Cultural Resources**

##### **Issue(s) Identified**

How would renewal of the grazing permit affect cultural resources eligible or unevaluated for the NRHP?

##### **Affected Environment**

The area of potential effect (APE) is defined as the BLM managed public land acres within the Murdoch Allotment. To evaluate potential effects to historic properties in the APE, a literature review was completed on of the entire allotment. No class III inventory was conducted of the APE. One known livestock concentration area located within the APE. Consultation was conducted with the State Historic Preservation Office (SHPO) under the Wyoming State Protocol Agreement between the BLM and the SHPO (State Protocol). Concurrence was received on the APE and level of inventory appropriate for the undertaking.

Following policy provided in Instruction Memorandum (IM) WO-99-039, IM WY-99-020, BLM Manual 8100 series, and the State Protocol a literature review was conducted of the allotment using SHPO and BLM records (BLM Cultural Project #010-2015-057). Results of the file search indicate approximately 10 acres, or less than 0.02%, of the allotment has been inventoried for cultural resources at the class III level. No cultural resource sites resulted from that survey. The current site density for the allotment is unknown.

##### **Direct and Indirect Effects**

##### **No Action /No grazing**

Under the No Grazing Alternative, the proposed grazing allotment would not occur. A review of the historical records on file in the Worland Field Office indicates that the Murdoch Allotment,

is not eligible for the National Register of Historic Places (36CFR§60.4(a) and (b)). Under this alternative there would be no direct or indirect impact to historic properties.

### **Proposed Action**

Under current policy when there will be significant changes in the grazing permit a review of cultural records can be used to identify affects to known historic properties (resources eligible or unevaluated for the NRHP). Results of the file search indicate that the Murdoch Allotment does not contain any historic properties. Consultation was conducted with the State Historic Preservation Officer (SHPO) under the State Protocol (BLM Cultural Project #010-2015-057).

Research indicates affects to historic properties are most probable in high use areas where livestock congregate (Osborn et al 1987). Concentration areas include water sources and sheltered areas, such as cliff faces and rockshelters, with a southern exposure in allotments used during the winter months. Within concentration areas trampling could modify a site assemblage through breakage, chipping, and /or displacement (Nielsen 1991). Outside concentration areas, livestock are dispersed and it can be predicted that impacts will be surficial or absent (BLM 1999).

In regards to unidentified historic properties, there is a direct relationship between the rangeland health and potential effects to cultural resources (BLM 2006). Provided rangelands remain in satisfactory condition and are not overgrazed, it is anticipated dispersed livestock grazing outside concentration areas will have no adverse effect on historic properties. Rangeland deterioration could constitute a viable threat to historic properties. Existing range improvements projects are considered an existing disturbance. After a determination by a cultural resource specialist, undertakings within previously disturbed areas are generally authorized to proceed without additional class III inventory (State Protocol V.B.iv). Any and all future range development projects within the allotment will comply with the State Protocol, are subject to relevant cultural investigations prior to permit issuance, and will be analyzed under a separate and site specific EA.

The Proposed Action will have no effect historic properties. No known historic properties were identified within livestock concentration area and the permit is designed to improve rangeland health. Because livestock grazing is a dynamic ongoing process, cultural resource specialists, in conjunction with BLM range management and the permittee, will periodically monitor and inspect heavy use areas following current policy (RMP and BLM Manual 8100 series). Any adverse effects discovered will be mitigated in accordance with the State Protocol. Standard cultural stipulations will be added to the terms and conditions of the grazing permit.

### **Cumulative Effects**

Since there would be no direct or indirect effects on known historic properties, there can be no cumulative effects.

### **Range Administration**

#### **Issue(s) Identified**

#### **Range Administration**

How would the proposed action and other alternatives impact the range administration in the allotment?

### **Affected Environment**

Livestock grazing in the Murdoch Allotment has likely occurred since prior to the passing of the Taylor Grazing Act in 1934. A review of the files for the allotment indicates that it was adjudicated around 1965. The Murdoch Allotment was formerly the Anchor pasture of the Three Peaks Anchor Allotment #00661. The grazing authorization for the allotment did not separate out the large pasture (Three Peaks) and the small pasture (Anchor). As a result, historical grazing information is not available. The grazing permit was cancelled in 2005. There have been no authorized livestock in the allotment for approximately ten years.

### **Estimated Carrying Capacity Utilizing the Rangeland Health Assessment Data**

The information from the vegetative portion of the Rangeland Health Assessments and the information from the respective Natural Resources Conservation Service (NRCS) Ecological Site Descriptions (ESDs) were used to develop an estimated carrying capacity.

The rangeland health assessments do define the current range conditions by ecological state which then were accurately compared to the ESDs to establish the prescribed stocking rate. The suitability of public lands is defined by slopes and distances from water. Steeper slopes reduce the suitability for grazing as does distance from water.

See Appendix B of this document for a detailed Suitability/Carrying Capacity spreadsheet. The ESD's prescribed stocking rates (by ecological state) are developed under an expected utilization level of 50% of the current year's growth while the proposed action depicted in the table is based upon a target of 35% utilization of current year's growth with an acceptable limit of 50% not to be exceeded in two consecutive years. If 50% is exceeded in two consecutive years that triggers a change in management to reduce utilization levels below 50%.

By targeting 35% utilization levels, use levels are not expected to exceed 50% within suitable acres of the allotment on average. Holechek, et al. defines 40-50% utilization as conservative to moderate (Table. 8.15). Appendix W of the Bighorn Basin Resource Management Plan-Final Environmental Impact Statement defines an appropriate utilization level for areas meeting rangeland health standards to be 50% or less in the growing season or 60% in the dormant season. The grazing prescription for this allotment is at the end of the growing season yet the plants are not in a dormant state. This applies to those areas of 14 inches or less of precipitation.

The 35% use level was used in the stocking rate analysis to provide a more conservative approach designed to accommodate use level objectives relative to annual variances in vegetative production.

#### **Carrying Capacity based on Suitable Acres and Ecological State**

<b>Allotment</b>	<b>BLM Acres</b>	<b>Suitable BLM Acres</b>	<b>ESD AUMS (50% Utilization)</b>	<b>Proposed AUMs (35% utilization)</b>
Murdoch	420	395	106	74

### **Direct and Indirect Effects**

#### **No Action/No Grazing**

Under this alternative, the livestock grazing permit for the Murdoch Allotment would not be issued and livestock grazing on 395 suitable acres of public lands would be unauthorized for an indefinite period of time. Denying the issuance of this grazing permit would not be in conformance with the WRMP and would require an amendment to remove it.

## **Proposed Action**

The proposed action would allow for 74 public AUMs of livestock grazing to be used each year from July 19 to August 20. This grazing would be by cattle and would occur primarily on 395 suitable acres of 420 total acres within the allotment. This represents 94% of the acres within the allotment. Therefore, approximately 6% of the acres within the allotment would receive little or no grazing from domestic livestock.

As portrayed above, the stocking rate analysis estimates there to be 106 AUMs available at 50% use while the proposed action prescribes 74 AUMs of use with a targeted utilization level of 35% of current year's growth. This alternative would allow for an appropriate amount of AUMs to be utilized by domestic livestock during the summer - a period post initial plant growth and reproduction yet before true plant dormancy. This is a time of year when the plant is still actively growing but has already produced and set seed for the year. This grazing would occur on suitable acres.

## **Cumulative Effects**

There are no active proposals or applications for current or future actions on the Allotment received by the BLM other than the current grazing application analyzed within this document. No authorized livestock grazing has occurred on the allotment for nearly 10 years. Because no foreseeable future actions or other present or past actions have been identified there would be no cumulative effects to range administration of the allotment.

## **Vegetation**

### **Issue(s) Identified**

Would the proposed action and other alternatives allow for the vegetative community of the allotment to maintain Rangeland Health Standard 3?

### **Affected Environment**

#### **Rangeland Health**

The Worland Field Office conducts monitoring to determine if Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming are met-this is commonly referred to as S&G's. The Worland Field Office bases S&G determinations on field observations, Indicators of Rangeland Health, and monitoring. The sites assessed represent a majority of the vegetation types and ecological sites in the allotments. The Ecological Site Descriptions (ESDs) developed by the Natural Resource Conservation Service (NRCS) are then used to determine what state the vegetation is in and if that state is meeting the requirements for healthy rangeland standards. These ESDs are specific to precipitation zone and Ecological Site.

S&Gs were performed in 2014 on the Murdoch allotment with determinations signed in the summer of 2015. For a more complete description of the process and findings of the S&Gs a citation for these documents and a website that they may be viewed at is located at the end of this EA in the References section. Appendix B depicts the amount of acres within each ecological site and state, as well as the appropriate stocking rate recommendations and suitability classifications within those sites/states.

In 2014, Rangeland Health Assessments were conducted on the allotment. It was determined that all of the acres (not including Rock Outcrop/Unclassified acres) were meeting the standard (**Map 2**).

Ecological sites encountered within the allotment are primarily shallow loamy and loamy sites. The allotment is located within the 10-14 inch precipitation zone. Within this zone and on the ecological sites the ESD's show that approximately 80% of the plant growth, including reproduction functions, in the 10-14" precipitation zone occurs about April 15 to July 15. Cool weather and moisture in September may produce some additional regrowth/green up of cool season plants which could continue to October if weather conditions allow.

#### Shallow Loamy sites

Within the shallow loamy sites of the allotment, the ecological states were defined as Perennial Grass/Mixed Shrub community.

The ecological state has a plant community that is still intact and dominated by cool season desirable species such as bluebunch wheatgrass and needleandthread grass. This state is resistant to change and well adapted to grazing. It is also possible to convert from this state to Historical Climax Plant Community (HCPC) through prescribed grazing schemes. The prescribed ESD stocking rate for this state at HCPC is 5 Acres/AUM while the stocking rate for the perennial grass/mixed shrub community is 5.9 Acres/AUM. As such the stocking rate of 5.9 Acres/AUM would be recommended by the ESD. These stocking rates are based upon a 50% utilization level.

#### Loamy sites

Within the loamy sites of the allotment, the ecological states were defined as Perennial Grass/Big Sagebrush community.

The Perennial Grass/Big Sagebrush sites have a plant community that is still intact and dominated by cool season desirable species such as bluebunch wheatgrass and needleandthread grass. This state is resistant to change and well adapted to grazing. In order for the community state to return to HCPC prescribed grazing schemes would need to be implemented. The prescribed ESD stocking rate for this state at Historical Climax Plant Community is 2.5 Acres/AUM however in the current state the prescribed stocking rate is 3.3 Acres/AUM. These stocking rates are based upon a 50% utilization level.

### **Direct and Indirect Effects**

#### **No Action/No Grazing**

Under this alternative, no livestock grazing would be authorized on 420 acres of public land of which 395 acres are suitable for livestock grazing. The vegetative community would be afforded the opportunity to initiate growth, maximize growth, and reproduce unabated by domestic livestock grazing. Based on the current condition of the communities, it would be expected that herbaceous growth would occur and the reproductive efforts of the vegetation would continue to be successful. It would be expected that the current range conditions could transition to a better ecological state/condition without mechanical treatments (NRCS-Ecological Site Descriptions).

#### **Proposed Action**

The Proposed Action would authorize a permitted use of 74 Active AUMs at a rate of 5.3 Acres/Animal Unit Month (A/AUM). This stocking rate is based upon suitable acres within the allotment and is based upon a 35% utilization level. In comparison, the ESDs recommend 3.7 A/AUM and a 50% utilization level.

Livestock grazing would remove a portion of the vegetation on the landscape. The impact would be limited to those areas that have available water, feed, and are not limited by topography-this defines suitable acres. Grazing by cattle would remove the herbaceous growth during the non-growing season which is defined as May through July 15 (WRMP, App. W). However, prior to any grazing impacts the vegetation within the allotment would have the opportunity to initiate growth, maximize growth, and reproduce unabated by domestic livestock grazing each year. As such, it would be expected that maximum annual herbaceous growth would be achieved (given weather conditions) and the reproductive efforts of the vegetation would be successful. This growth and reproduction would occur primarily in May and June. Of this annual growth, grazing would be permitted to occur post growing season and it would be expected that the prescribed grazing would account for 35% utilization of the current year's growth.

The non-growing season use of the vegetation by livestock would minimize impacts to the vegetative resources and allow for the plants to gain vigor and reproduce. Based upon the prescribed grazing scheme and the conservative stocking rate (better than prescribed by the ESD), and the expected use level of 35% it is expected the rangeland health conditions of the allotment would maintain and could likely transition to the next higher ecological state without mechanical treatments.

When compared to the no action/no grazing alternative, the proposed action would allow livestock grazing within the allotment. Grazing would remove 74 public AUMs of forage each year on suitable acres during the vegetative dormant season-that period outside of growing season (WRMP, APP W, Table W-1). Like the no grazing alternative, the ecological states could transition to a better ecological state/condition without mechanical treatments (NRCS-Ecological Site Descriptions). The ESDs for these plant communities' states that prescribed grazing of livestock would allow improvement towards the HCPC. The prescribed grazing proposed, which includes dormant season use and a reasonable stocking level that was adjusted for suitability, would result in the vegetation to meet or exceed expectations resulting in the Rangeland Health Standard 3. These vegetative communities would be more resilient to disturbance and would either increase or maintain their diversity.

### **Cumulative Effects**

There have been no active proposals or applications for current or future actions within the Murdoch Allotment other than the proposed action analyzed within this document. Therefore, there would be no cumulative effects to the vegetative resources.

### **Soils and Hydrology**

#### **Issue(s) Identified**

How would the issuance of a grazing permit impact the soil and water resources as related to rangeland health Standard 1? *"Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff."*



If a change in runoff were to occur as a result, what would be the impact to water quality from a new grazing permit in the watershed of the allotment?

## Affected Environment

### Soils

The Murdoch Allotment is situated within the 10-14 inch Big Horn Basin Precipitation zone. Based on the soil survey data for Hot Springs County, the dominant ecological sites found in the allotment are listed below:

Shallow Loamy 10 – 14 inch precipitation zone R032XY362WY

Loamy 10-14 inch precipitation zone R032XY322WY

Assessment 1 was located on Map Unit 723, Blazon-Delphil Loams (Map 2) on a Shallow Loamy ecological site. The soils are shallow (less than 20 inches to bedrock) well-drained soils formed in alluvium over residuum or in residuum. These soils have moderately slow to moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures; very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. The soil characteristics having the most influence on the plant community are the shallow depth, and potential for elevated quantities of soluble salts. The surface texture was a sandy clay loam with a moderate depth. The A horizon was three inches in depth and the B horizon was three to five inches. There was a slight surface effervescence in the A horizon and a strong surface effervescence in the B horizon. The pH was not noted.

A review of the Loamy ecological sites included Map Unit 736, Forelle-Pinelli Loams. These soils are very deep to moderately deep (greater than 20 inches to bedrock); moderately well to well-drained and moderately slow to moderate permeable. The soil characteristic having the most influence on the plant community is the available moisture and the potential to develop soluble salts near the surface.

Using the weighted average of the soil map units, the dominant soil hydrologic groups found in the allotment are approximately half B type soils with moderate infiltration and the other half are type D soils with very low amounts of infiltration (**Map 4**).

### Surface Water/Watershed

The Murdoch allotment falls entirely within the Owl Creek USGS (level #5) watershed. The allotment contains the middle reaches of the foothills of the Lower North Fork of Owl Creek sub-watershed (level #6) in Owl Creek. The allotment consists of only 1.5 % of the total area of the sub-watershed (**Map 5** and the table below).

Sub-Watershed Name (HU12)	HUC 12	Acres	(mi)	Allot Acres	Allot mi <sup>2</sup>	% of Acres of Sub-watershed in the allotment
Lower North Fork Owl Creek	1008000702	34,435	53.8	504	0.8	1.5

There is a portion of Rattlesnake Creek located in southeast quarter of section 9 that is naturally ephemeral, however; it receives flow through sub-irrigation that occurs on private land above the segment. In addition there are two unnamed ephemeral drainages on the southern portion of the allotment that confluence with Rattlesnake Creek one mile downstream and into the North

Fork of Owl Creek several miles east of the allotment. These drainages originate from volcanic and other sandstone outcrops and trend in an eastern direction in the allotment. There are no reservoirs on public land in the allotment.

### **Direct and Indirect Effects**

#### **No Action/No Grazing**

Currently the soil parameters are meeting rangeland health Standard 1, which states

*“Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.”*

With the continued absence of permitted grazing, the rangeland health attributes of *Soil and Site Stability* and *Hydrologic Function* would be anticipated to improve toward the soil conditions to HCPC, when compared to the proposed action alternative. Potential changes would still be characterized as slow and steady, due to the arid nature of the allotments. Without the removal of the current year's growth, total vegetative cover would stabilize or increase, infiltration would remain stable or increase and runoff would be at the same current rate or reduced. The amount of runoff would be correlated to vegetation cover and precipitation events. Erosion indicators, particularly amount of bare ground, rills, pedestals, water flow patterns would continue to gradually heal. The erosion indicators would trend in a direction to natural undisturbed reference conditions. Plants that are pedestalled and the historic loss of the A horizon that has occurred in the allotment would be slower to respond. The amount of time necessary to recover and meet Standard 1 as defined below is unknown. There would be no expected increase in the amount of erosion and/or runoff. The overall volume of runoff would decrease and the water quality of runoff would remain unchanged or improve as a result of upland conditions meeting Standard 1. Any indirect changes to water quality would be expressed in downstream drainages below the allotment. Reduced runoff generally leads to more stable stream channel banks and reduced in channel erosion rates.

#### **Proposed Action**

Under this alternative a grazing permit would be issued for the allotment. Permitted grazing would occur on an annual basis at the level outlined in the grazing section of this document. This would have a potential to affect the *Soil and Site Stability* and *Hydrologic Function* of the soils in the allotment. There would be annual disturbance from hoof action and partial vegetation removal from grazing activity. This could cause minor compaction in the top of the soil profile, and reduction of vegetative cover to provide litter and organic matter in the top of the soil profile. The soil and erosion indicators are linked to proper vegetation management. The prescribed grazing, as proposed, is at an appropriate level leaving sufficient vegetative cover and litter remaining post grazing to provide conditions that would continue to support soil Standard 1.

There has been historic grazing that has occurred in the allotment at sufficient levels that has been able to support and maintain Rangeland Standard 1. The issuance of the permit would be at an appropriate level (see Range Administration section). The allotment consists of 1.5 percent of the sub-watershed. Due to the minimal contribution of the allotment to the watershed, along with proper vegetation management, there would be no measurable increase in volume of runoff in the sub-watershed. There would be a very minor increase in runoff and erosion when compared to the no-action alternative; however the increase would not exceed erosion threshold levels that would

cause degradation or non-compliance with the *Soil and Site Stability* and *Hydrologic Function* in the allotment. There is no perennial water in the allotment and animal waste from the grazing would remain in upland areas and would not impact downstream water quality with the exception of very intense storm events when overland flow occurs.

### **Cumulative Effects**

There has been historic grazing that has occurred in the watershed and allotment area. The issuance of this permit would not create a cumulative effect that would impact soil or water resources within the area. There are no other current actions or connected actions that are carried forward for cumulative effects analysis.

### **Fish/Wildlife (Including Threatened, Endangered, Candidate and BLM Sensitive Species)**

#### **Issue(s) Identified**

How would the proposed action and other alternatives affect important habitats used by mule deer, antelope, and sagebrush obligate birds like the sage-grouse, as related to rangeland health Standard 4? *“Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened species, endangered species, species of special concern, or sensitive species will be maintained or enhanced.”*

#### **Affected Environment**

S&Gs were performed in 2014 on the Murdoch allotment with determinations signed in the summer of 2015. It was determined that all of the acres (not including Rock Outcrop/Unclassified acres) were meeting the Standard 3 and 4, (Map 2). For a more complete description of the S&Gs a citation for these documents and a website is located at the end of this EA in the References section. Appendix B depicts the amount of acres within each ecological site and state, as well as the appropriate stocking rate recommendations and suitability classifications within those sites/states.

Ecological sites encountered within the allotment are primarily shallow loamy and loamy sites.

Within the shallow loamy sites of the allotment, the ecological states were defined as Perennial Grass/Mixed Shrub community with a plant community that is still intact and dominated by cool season desirable species such as bluebunch wheatgrass and needleandthread grass. Within the loamy sites of the allotment, the ecological states were defined as Perennial Grass/Big Sagebrush community with a plant community that is still intact and dominated by cool season desirable species such as bluebunch wheatgrass and needleandthread grass.

#### **Wildlife**

The Murdoch allotment provides wildlife habitat, specifically forage and cover needs for big game seasonally and yearlong. The entire allotment (420 BLM administered acres) is mapped as crucial winter range for mule deer. Antelope are also common, and smaller numbers of both mule deer and antelope inhabit the allotment yearlong. The primary vegetative community providing wildlife forage and cover is the Perennial Grass/Big Sagebrush community. These sagebrush communities are important to wintering mule deer and antelope, depending on the sagebrush plants for forage.

## **Threatened, Endangered, Candidate, or Sensitive Species**

There are no known threatened or endangered wildlife species within these allotments, but the sage-grouse, sage thrasher, sage and Brewer's sparrow, are all Wyoming BLM sensitive species.

The sagebrush/bunchgrass communities provide breeding, nesting and early brood rearing habitat for sage-grouse as well as breeding, nesting and foraging habitat for sagebrush obligate passerine species like the sage thrasher, sage and Brewer's sparrow. The entire allotment (420 BLM administered acres) is within Priority Habitat Management Area (PHMA) for Greater sage-grouse, (**Map 6**). The closest occupied leks are .9 miles north and 2.3 miles southwest, none have been identified within this allotment. Nesting and late brood rearing have not been documented in this allotment, however in an analysis of sage-grouse studies conducted in 7 areas in Wyoming since the mid-1990s, Holloran and Anderson (2005) found that 45% of nests were located within 2 miles (3km) of the lek where the hen was bred, and 64% of the nests were within 3 miles (5 km) of the lek. Therefore, female sage-grouse from the two neighboring occupied leks are likely using suitable sagebrush habitats within this allotment for nesting habitat. A single sage-grouse habitat assessment transect was conducted within representative sage-grouse habitat in the south central portion of this allotment (**Map 6**).

## **No Action/No Grazing**

Under this alternative there would be no livestock grazing permit issued for the Murdoch allotment. In the absence of livestock grazing, all of each year's annual herbaceous production within the suitable acres of Perennial Grass/Mixed Shrub and Perennial Grass/Big Sagebrush Plant Communities within the allotment would be available for wildlife forage and cover needs as well as residue and litter for the long term maintenance of the plant communities themselves and the surrounding watershed.

Livestock grazing generally occurs with some variable influence to wildlife habitat and populations, so the elimination of livestock grazing could benefit these species. In the absence of livestock grazing, any competition for forage or cover between livestock and wildlife would be eliminated, and the public land within the allotment would be available for exclusive use by wildlife. The No Grazing alternative would meet the purpose of improving rangeland health by removing the grazing disturbance and providing indefinite rest from livestock use. No vegetation would be removed by livestock. The habitats or vegetative communities that were meeting standards will be enhanced under this alternative. This alternative would help the transitioning sites improve towards HCPC because they would not be subject to disturbance outside of natural occurrences. This transition towards HCPC would show increases in herbaceous production, residue, litter, frequency, and composition of key bunchgrass species. These vegetative enhancements towards HCPC are desirable to sagebrush obligate species, and enhanced big game winter range and avian sagebrush obligate nesting use would be anticipated. This alternative, for habitats or plant communities meeting standards, would provide for the forage and cover needs of wildlife, as well as residue and litter for the long term maintenance of the sagebrush/bunchgrass community as well as the sagebrush obligates already mentioned.

## **Proposed Action**

The analysis area is defined as all BLM administered surface acres (420 acres) within the allotment. The proposed action would authorize 74 AUMs of non-growing season cattle grazing use to occur from 7/19 to 8/20 on the Murdoch allotment. Proposed livestock grazing would be at appropriate stocking rates, and these stocking rate levels along with the dormant season use will

promote rangeland health by leaving adequate amounts of plant residue, post livestock grazing, to support maintenance and enhancement of the watershed and wildlife habitats.

## **Wildlife**

This alternative would authorize livestock grazing on approximately 395 BLM administered acres identified as suitable for cattle. Competition for forage or cover between livestock and wildlife would be expected to occur to some degree in area overlapping with crucial winter range. Within the analysis area there are 395 acres identified as suitable for cattle grazing that are also identified as crucial winter range for mule deer and antelope. Mule deer and Antelope would be in competition with cattle for forage or cover on 100% BLM administered surface within the project area.

## **Threatened, Endangered, Candidate, or Sensitive Species**

Within the analysis area there are 420 acres of PHMA on BLM administered surface and 395 acres of those acres are also identified as suitable for cattle grazing. Sagebrush communities within the PHMA are likely providing some level of sage-grouse seasonal habitats as well as nesting and foraging habitat for other sagebrush obligate passerines. Approximately 100% BLM administered surface suitable for livestock grazing in the project area is mapped as PHMA.

Because this proposed stocking rate is within the estimated carrying capacity based on the rangeland health assessment, and the proposed livestock grazing season of use will be non-growing season use, the least critical period for livestock grazing, this proposed alternative would result in the maintenance and/or enhancement of the 420 acres of Perennial Grass/Mixed Shrub and Perennial Grass/Big Sagebrush Plant Communities within the allotment. Both of these plant communities still retain the soil and vegetative components necessary to respond to favorable grazing use levels and timing, and will likely show increases in herbaceous production, residue, litter, frequency, and composition of key bunchgrass species and would be expected to transition towards their historic climax plant community (HCPC). These vegetative enhancements towards HCPC are desirable to sagebrush obligate species, and enhanced big game winter range and avian sagebrush obligate nesting use would be anticipated. This alternative will provide for the forage and cover needs of wildlife, as well as residue and litter for the long term maintenance of the sagebrush/bunchgrass community as well as the sagebrush obligates mentioned above.

An analysis of sage-grouse nest site selection from 7 study areas in Wyoming indicates that residual grass height should be a minimum of 3.9 inches (10 cm) in Wyoming big sagebrush dominated sites (Holloran et al. 2005) compared to 7 inches (18 cm) minimum live perennial herbaceous vegetation height recommended by Connelly et al. (2000) in breeding habitats. Hens nesting in these cover conditions experience higher nest success rates than those nesting under inferior cover conditions (DeLong et al. 1995, Holloran et al. 2005). As was stated above in the Affected Environment section under Range Administration the prescribed grazing utilization level for this alternative is 50% use, and the 35% use level was used in the stocking rate analysis to provide a more conservative approach designed to accommodate use level objectives relative to annual variances in vegetative production. According to Holechek, et al., 31-40% utilization is defined as conservative. From Table. 8.15. of that document, at a level of 31-40% use an adequate amount of herbaceous residue would remain for sage-grouse nest concealment when compared to that prescribed by Holloran or Connely.

Compared with the No Grazing alternative, under the proposed action acres meeting standards and able to transition towards HCPC, the transition could occur faster under the No Grazing alternative.

**Cumulative Effects:**

There were no cumulative effects to wildlife identified beyond the proposed livestock grazing impacts considered and analyzed within the alternatives impact analysis.

## Tribes, Individuals, Organizations, or Agencies Consulted:

### List of Persons, Agencies and Organizations Consulted

Name
SHPO
Wyoming Game and Fish

### List of Preparers

Name	Title
Dora Ridenour	Archaeologist
Monica Goepferd	Civil Engineer
Leta Rinker	Realty Specialist
Karen Hepp/John Elliott/Mike Peck	Rangeland Management Specialist
Adam Babcock	Recreation Specialist
Tim Stephens	Wildlife Biologist
Jared Dalebout	Hydrologist
Alex Jensen	Geologist
Darci Stafford	NRS
Franklin Sanders	Petroleum Engineer
Dr. Yvonne Warren	NRS
Cam Henrichsen	Rangeland Management Specialist
Nancy Patterson	Recreation Specialist
Jim Gates	Forester
Holly Elliott	P&EC

## References Cited

- Pellant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, version 4. Technical Reference 1734-6. U.S. Department of the Interior, Bureau of Land Management, National Science and Technology Center, Denver, CO. BLM/WO/ST-00/001+1734/REV05.
- U.S. Department of the Interior, Bureau of Land Management 2015. Record of Decision and Approved Resource Management Plan for the Worland Field Office. Worland, WY.
- U.S. Department of Agriculture, Natural Resources Conservation Service. 2008. Ecological Site Description System. Site ID: R032XY322WY, and R032XY362WY. Available on the web at: <http://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD>
- U.S. Department of the Interior, 2015. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming. Murdoch Allotment No. 17741. Bureau of Land Management, Worland Field Office, Worland, WY.
- Holechek, Jerry. Pieper, Rex D. Herbel, Carlton H. 2011. *Range Management: Principles and Practices 6th ed.*: Prentice Hall
- U.S. Department of the Interior, Bureau of Land Management 1993. Rangeland Monitoring: Analysis, Interpretation, and Evaluation: Technical Reference 4400-, 7. Appendix 2. <http://digitalcommons.usu.edu/govdocs/280>
- Delong, A. K., J. A. Crawford, and D. C. Delong, Jr. 1995. Relationships between vegetational structure and predation of artificial sage grouse nests. *Journal of Wildlife Management* 59:88-92.
- Holloran, M.J., and S.H. Anderson. 2005. Spatial distribution of Greater Sage-Grouse nests in relatively contiguous sagebrush habitats. *Condor* 107:742-752.
- Holloran, M.J., B.J.Heath, A.G. Lyon, S.J. Slater, J.L.Kuipers, and S.H.Anderson. 2005. Greater Sage-Grouse nesting habitat selection and success in Wyoming. *Journal of Wildlife Management* 69:638-649.
- 1999 A Research Design for the Bishop Field Office Grazing Allotment Lease Renewal Assessments, Cultural Resource Project:CA-170-99-04.
- 2006 Summary of Livestock Grazing Impacts on Archeological Sites Located on BLM-Administered Lands in Colorado: A Study of Cultural Resource Assessments for Grazing Permit Renewals from Fiscal Year 1998 to 2003.
- Nielsen, Axel E.
- 1991 Trampling the Archaeological Record: An Experimental Study. *American Antiquity* 56(3):483-503.
- Osborn, Alan, S. Vetter, R. Hartley, L. Walsh, and J. Brown
- 1987 Impacts of Domestic Livestock Grazing on the Archeological Resources of Capitol Reef National Park, Utah. *National Park Service Midwest Archeological Center, Occasional Studies in Anthropology*, No. 20. Lincoln, NE.

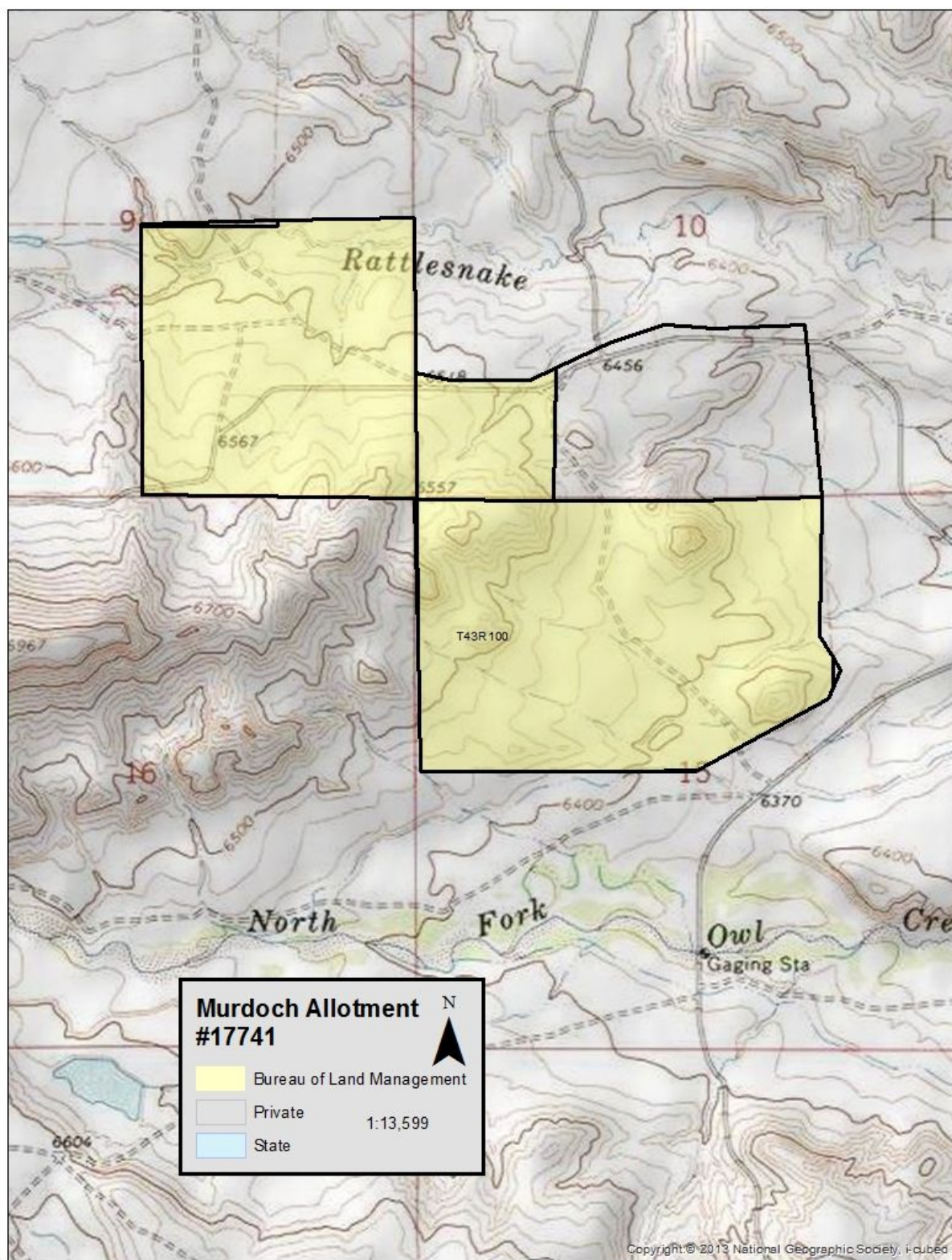


U.S. Department of the Interior. 2015. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming. Available at: <http://www.blm.gov/wy/st/en/info/NEPA/documents/wfo/rhealth.html>

U.S. Department of Agriculture, Natural Resources Conservation Service. Ecological Site Description System. Site ID: R032XY366WY, R032XY322WY, R032XY362WY, R032XY344WY, and R032XY350WY.

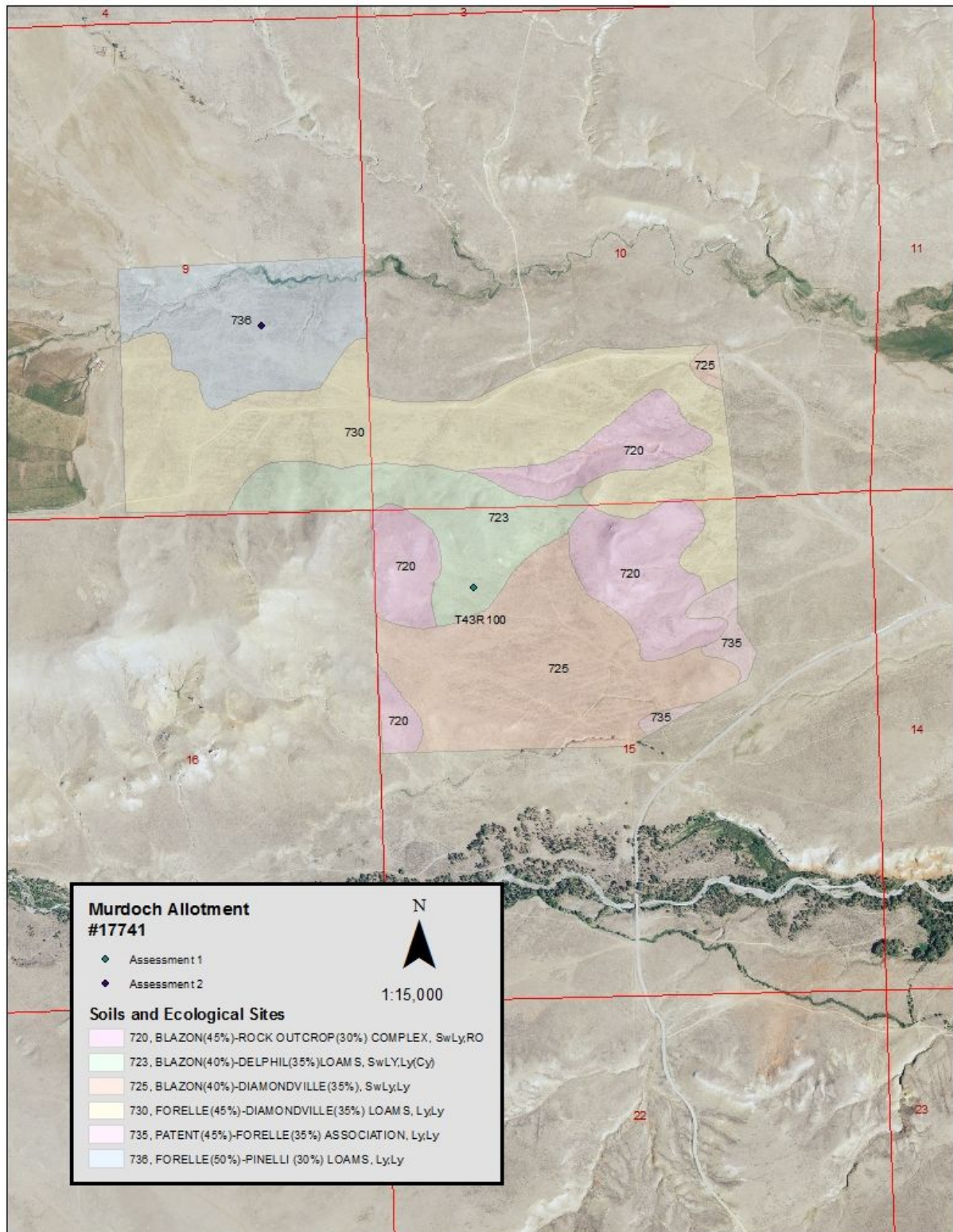
## Appendix A: Maps

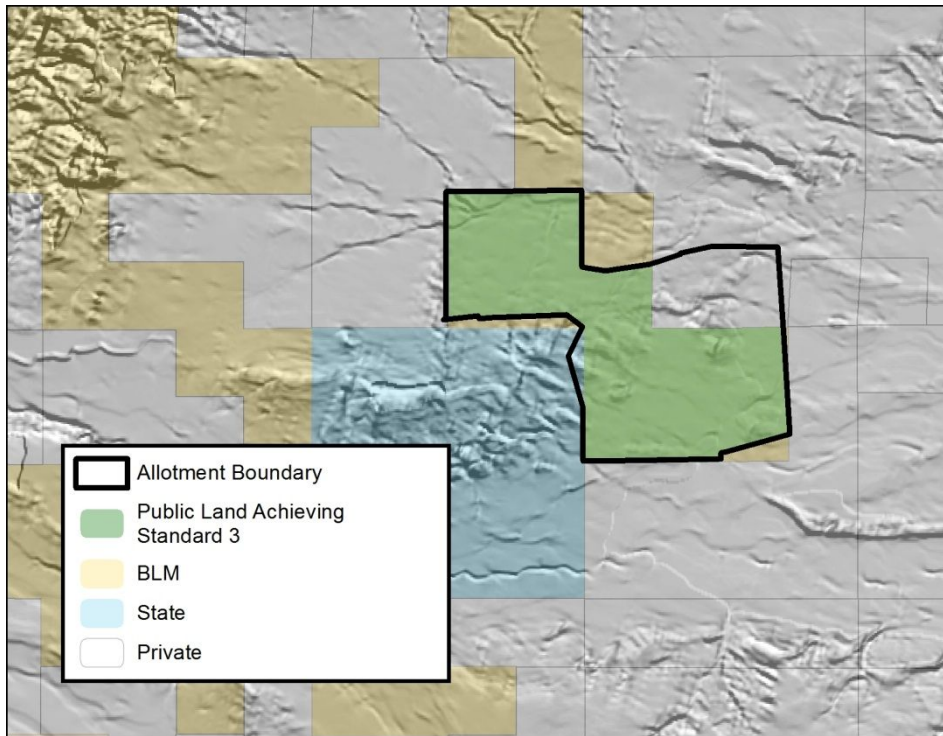
Map 1: Allotment Map





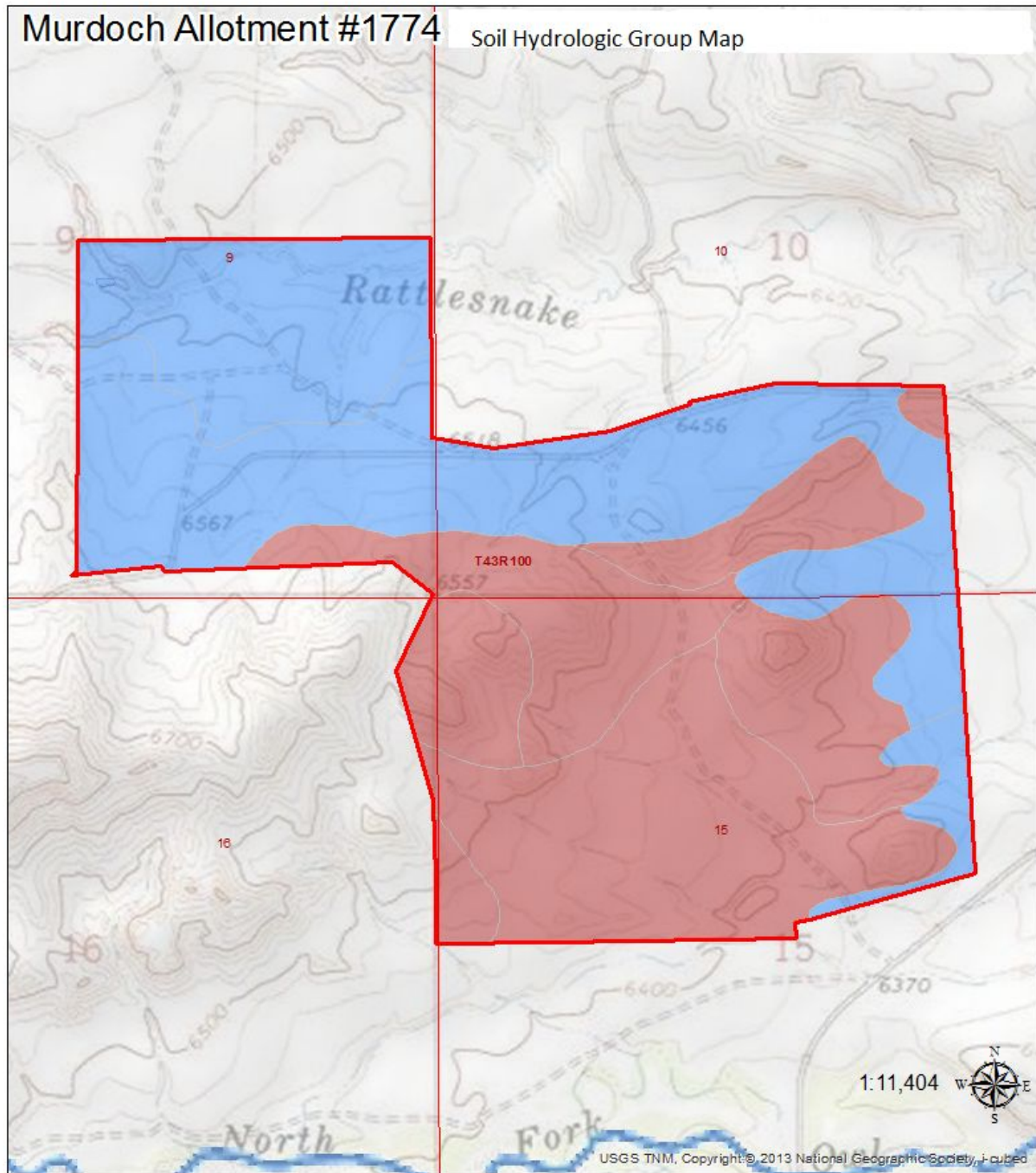
Map 2: Soils, Ecological Sites, and Assessment Sites





<b>Land Health Reporting Categories</b>	<b>Acres</b>
<b>Public Land Achieving Standard 3</b>	420
<b>Public Land Not Achieving Standard 3</b>	0
<b>Public Land where Land Health Standard 3 Does Not Apply or Unevaluated</b>	0
<b>Total Public Land Acres</b>	420


*Map 4: Hydrologic Group B, C and D Soils*



 Murdoch Allotment Boundary

**Hydrologic**

 B- Type

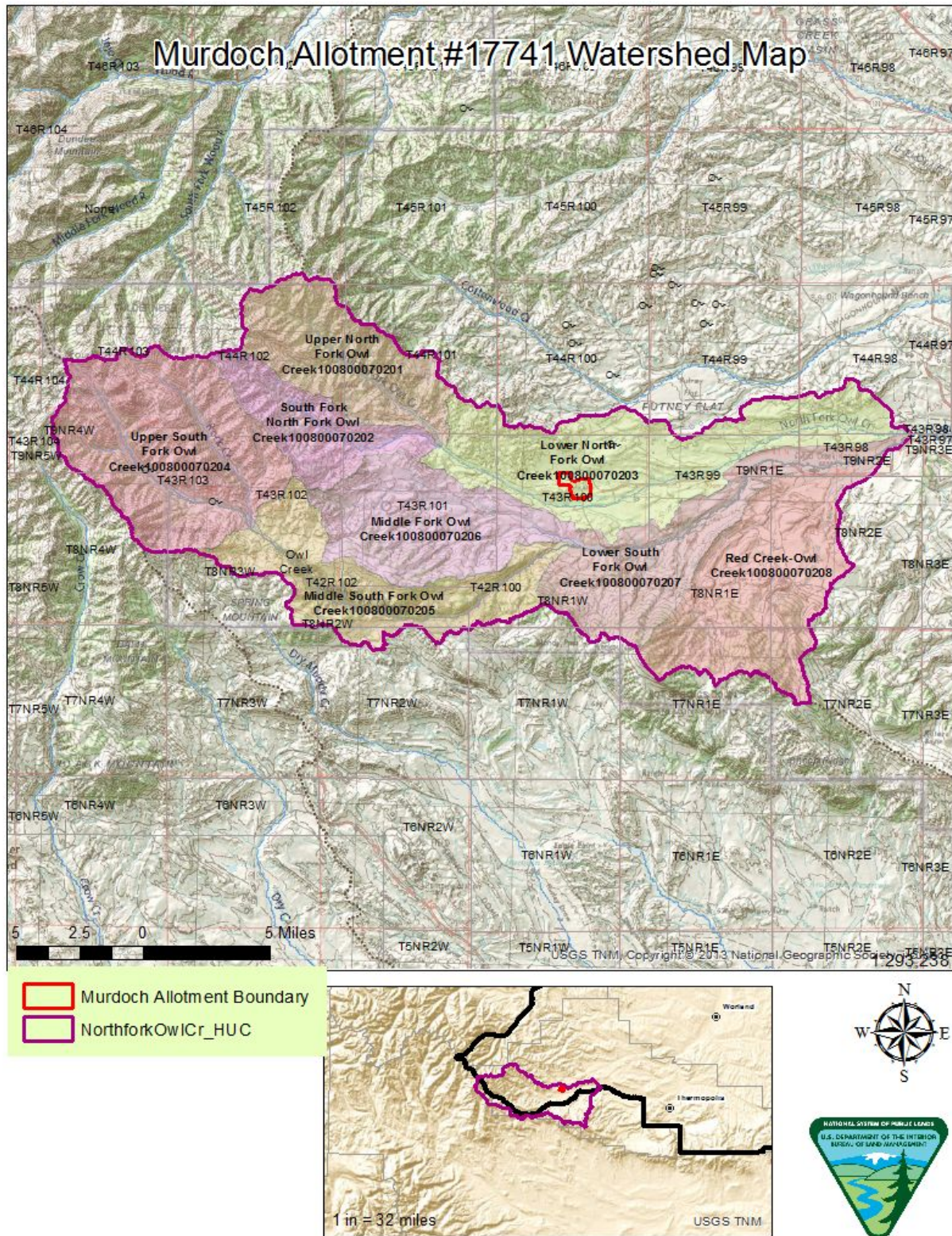
 D-Rock Outcrop

0.15 0.075 0 0.15 Miles



*Map 5: Watershed Map*



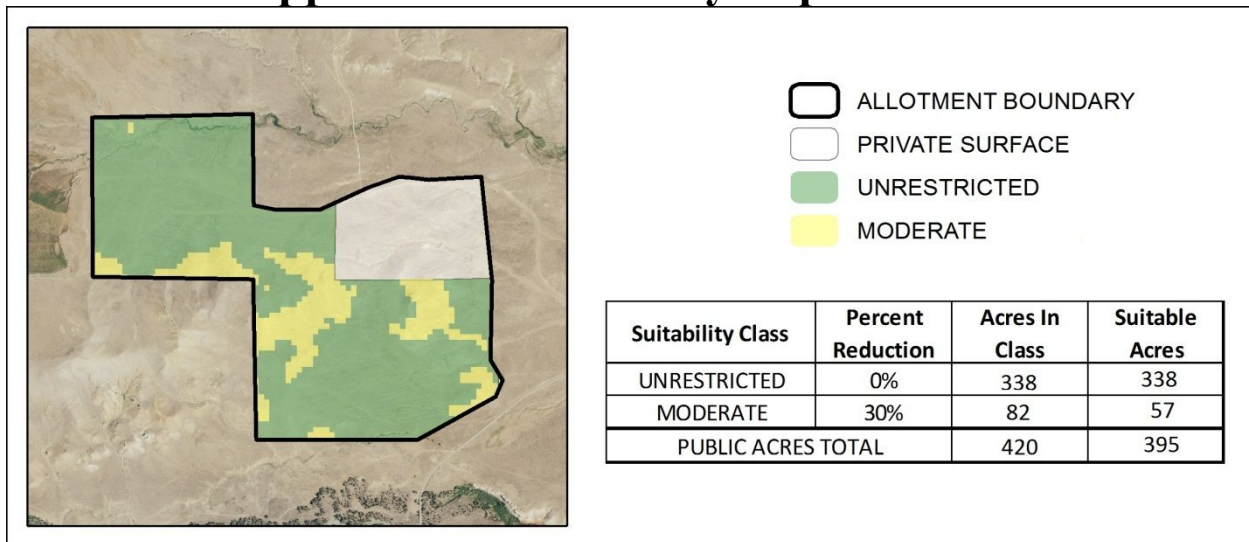


Map 6: Wildlife Habitat Resources





## Appendix B: Suitability/Expected Use



In order to better comprehend how percent slope and distance from water sources can attribute to limiting factors on grazing use, an ArcMap GIS analysis was used to develop an Expected Use pattern map. Analyzing percent slope and distance from water concurrently on spatial and visual bases helps illustrate a general prediction on the relative degrees of use that might occur within an Allotment or Pasture. In addition, each level of expected use in the allotment can be quantified by acres and a percent from total acres can be calculated. The calculated acreages can in turn be used as an aid for calculating stocking rates. In this case the levels of expected use were divided in to five different classes. The expected use categories are similar to the commonly used herbaceous utilization classes. Please keep in mind that the expected use classes are not met to be utilization definitions but rather a reference to available or accessible forage. The Expected Use classes are:

- **Unrestricted:** Concentration areas or thoroughfares that do not have any limiting factors and have 100 percent accessible forage.
- **Moderate:** Areas readily used but have some limiting factors with at least 40-60 percent accessible forage.
- **Light:** Areas with 20-40 percent accessible forage because of limiting factors.
- **Slight:** Areas that have casual use with 5-20 percent accessible forage because of limiting factors.
- **Incidental:** Areas that usually have negligible grazing because of longer distances from water or forage is unattainable because of slope steepness or rocky outcrops.

Several different layers are needed to produce a single coverage of expected use. The layers needed are: Allotment boundary, pasture boundaries, reliable water source points, and percent slope derived from a DEM raster.

### Slope:

The percent slope coverage is made up of a succession of polygons created from a DEM raster layer and divided into ranges of percent slope from 0-10%, 10-30%, 30-60%, 60-100%. The percent slope layer is first clipped to the Allotment/Pasture boundaries and each polygon within



the layer has acreages calculated for later use in determining the percent of acres within the expected use classes. The percent slopes are then grouped based on the guidelines by percent reduction in grazing capacity shown below (Holechek, 2011).

Percent Slope	% Reduction in Grazing Capacity
0-10	None
10-30	30%
30-60	60%
60 +	100%

### **Distance from Water:**

Distance from water sources are derived by creating and adding a multiple ring buffer layer around the Points within the allotment/pasture. The Buffers are defined by distance in half mile increments up to at least 3 miles. The buffers are then classed based on commonly suggested guidelines of percent reduction in grazing capacity shown below (Holechek, 2011). These buffers are also clipped to the boundaries of the Allotment or Pasture.

Distance From Water	% Reduction in Grazing Capacity
0-1 mile	None
1-2 miles	50%
2-3 miles	100%

### **Combined Reduction Values:**

To generate a separate layer that shows one coverage of expected use, the percent slope and buffered distances to water layers are joined by the union geoprocessing tool which is an overlay analysis that combines the overlapping spatial and attributes features of both layers. Once the new layer is created, it's attributes table is used to run further calculations. The fields representing distance from water and the percent slope values are then assigned a percent reduction values taken from the two tables above. These reduction values are then added together into a new field that should give a range of numbers from 0 to over 100. These values can be divided and categorized into the five Excepted Use Classes shown below and further represented by the breakdown of symbology shown on the map.

Limiting Values	Expected Use Class	Percent Reduction In Grazing Capacity
0-29	Unrestricted	None
30-49	Moderate	45%
50-79	Light	65%
80-99	Slight	90%
100+	Incidental	100%

Percent of acres within each Expected Use Class can also be calculated from the attributes table by hand or through running statistical analyses. Suitable acres are calculated by subtracting the Percent Reduction Values from the Total Acres within each Use Class polygon.

Most Expected Use analysis represent use that would occur with cow/calf pairs in spring or hot season use with the worst case scenario for water availability. Other factors such as kind or class of livestock, season-of-use, natural or manmade barriers, and variation of water availability can

also be adjusted into the percent reduction in grazing capacity and different variations of maps can be easily generated.

### **Suitable Acres with Stocking Rates:**

Stocking rates can also be calculated in conjunction with the suitability analysis. Polygons based on the NRCS soil surveys can be cross-referenced with Range Site information. Based on monitoring data or professional judgment each Range Site is assigned an Ecological State and its recommended yearlong stocking rate from the NRCS Ecological Site Description. The Range Site and stocking rate polygon can then be unionized with the polygons of the expected use analysis.

Once the suitability and range site information is combined, the suitable AUMs within the pasture or allotment boundary is calculated by multiplying suitable acres with the recommended AUMs per acre stocking rate.

<b>Suitable/Available Acres</b>			
<b>Category (Class)</b>	<b>Acres in Class</b>	<b>% Reduction</b>	<b>Suitable Acres</b>
UNRESTRICTED	338.0	0%	338.0
MODERATE	82.0	30%	57.0
<b>TOTAL PUBLIC ACRES</b>	<b>420.0</b>		<b>395.0</b>

### **Murdoch Suitability**

<b>Ecological Site</b>	<b>Precip Zone</b>	<b>Ecological State</b>	<b>Acres/AUM (50% use)</b>	<b>Acres/AUM (35% use)</b>	<b>Suitable Acres- BLM</b>	<b>Suitable AUMs (50% use)</b>	<b>Suitable AUMs (35% use)</b>
Shallow Loamy	10-14	Perennial Grass/Mixed Shrub	5.9	8.4	104	18	12
Loamy	10-14	Perennial Grass/Big sagebrush	3.3	4.7	291	88	62
				<b>TOTAL</b>	<b>395</b>	<b>106</b>	<b>74</b>

### **Reference:**

Holechek, Jerry. Pieper, Rex D. Herbel, Carlton H. 2011. *Range Management: Principles and Practices 6th ed.*: Prentice Hall.

## **Appendix C: Proposed Action Other Terms and Conditions**

- Livestock number may vary in the allotment so long as grazing is within authorized period and active AUMs are not exceeded
- Utilization should not exceed 50% based on an average of several sites throughout the allotment or through use pattern mapping using BLM approved methods. If use exceeds 50% in 2 consecutive years the BLM will coordinate with the permittee to reduce grazing in the third year to be under the 50% use level.